

Standard External Collaborator Application

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Project: A Study of Galaxy Populations within SPT Clusters

Contact person: Joe Mohr <jmohr@physik.lmu.de>

Participants:

DES: Manda Banerji, Wayne Barkhouse, Shantanu Desai, Christina Hennig, Joe Mohr, Kathy Romer, Alex Saro, Jeeseon Song, Alfredo Zenteno

EXT-SPT: Matt Ashby, Mark Brodwin, Mike McDonald, Brian Stalder

Working Group(s): Cluster Working Group

Wiki link(s):

https://cdcv.sfnal.gov/redmine/projects/des-clusters/wiki/Galaxy_Populations_within_SPT_Selected_Clusters
https://cdcv.sfnal.gov/redmine/projects/des-clusters/wiki/Study_of_BCGs_within_SPT_Selected_Clusters

Dataset(s): DES-SV imaging data, SPT cluster candidate list over the DES-SV imaged portion of the sky and associated Spitzer snapshots of these candidates where available. There are approximately 60 SPT clusters with a minimum of 5 minutes exposure in each of the griz bands, and about half that number have a minimum exposure of 10 minutes in each of the griz bands.

Duration: 1 year

Deliverable(s): We envision two analyses leading to at least two papers:

- 1) Properties of galaxies within SPT selected galaxy clusters
- 2) Photometric properties of BCGs within SPT selected galaxy clusters

Overview:

We propose to use the DES-SV data to study the galaxy properties of the overlapping SPT galaxy clusters. We envision two focused projects. One would focus on the photometric properties of the BCGs within the SPT selected clusters. The other would focus on the study of the luminosity functions, radial profiles, halo occupation numbers, stellar mass measurements and blue fractions of the full galaxy populations.

The DES-SV and SPT data would allow for a modest sized but complete sample of SPT selected systems to be studied with relatively homogeneous multiband photometry. Because of the Sunyaev-Zel'dovich Effect selection, the galaxy population related selection biases should be less evident than in optically selected cluster samples.

This proposal, if accepted, would allow the DES-SV data needed for this project to be accessed by the non-DES members of SPT who are involved in this project, and it would also allow the proprietary list of SPT cluster candidates (i.e. this list includes both published and non-published SPT clusters) to be accessed for the purposes of this project by the non-SPT members of DES.

Mike McDonald (SPT, MIT) has proposed the BCG project, which builds upon work that he and Alfredo Zenteno within SPT have been doing with non-DES data

(McDonald et al 2012; Song et al 2012). We have invited people on both the DES and SPT sides to make contributions to this project, and the people who have responded are listed on the project wiki page (link appears above). Manda Banerji, Wayne Barkhouse and Kathy Romer have also expressed interest in this project. Manda Banerji is particularly interested in bringing the VISTA NIR imaging data into this study. Any analysis involving the VISTA data would be subject to the VHS-DES MOU, which is still being finalized.

Joe Mohr has proposed the galaxy populations study, which would build upon an earlier study of SPT selected clusters (Zenteno et al 2011) as well as ongoing thesis work by Alfredo Zenteno that is focused on the galaxy populations of the 26 most massive SPT selected systems published in Williamson et al (2011). The DES-SV data offer the chance to explore a small but still complete sample of SPT selected clusters. Christina Hennig would lead this study, working closely with Alfredo Zenteno and the rest of us who have joined the project, including non-DES member Brian Stalder (EXT, Harvard), Mark Brodwin (EXT, U Missouri) and Matt Ashby (EXT, SAO). As in the other project, Manda Banerji is particularly interested in bringing the VISTA NIR imaging data into this study. Any analysis involving the VISTA data would be subject to the VHS-DES MOU, which is still being finalized.

Because of the existing DES-SPT MOU it is expected that this application can be expedited for approval. The key issues that hinge on this application are (1) access of non-DES members of SPT to the DES-SV data, (2) access of non-SPT members of DES to the SPT cluster candidate list over the DES-SV region, and (3) wiki and mailing list access to simplify communication during the period of the project.

The author lists for the papers that result would conform to the rules set out in the DES-SPT MOU (and additionally the DES-VHS MOU in the case of papers that include VISTA data).